Government of Madras.

PUBLIC WORKS DEPARTMENT.

IRRIGATION.
ACCOUNT.

G.O. No. 370 I., 28th August 1916

N. F.

Emergency shutter of the Periyar head sluice at Thekkady, Periyar system

Sanctioning an estimate amounting to Rs. 4,624 for improvements to the —, Madura division.

Government of Madras.

PUBLIC WORKS DEPARTMENT.

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Emergency shutter of the Periyar head sluice at Thekkady, Periyar system

Sanctioning an estimate amounting to Rs. 4,624 for improvements to the —, Madura division.

GOVERNMENT OF MADRAS

PUBLIC WORKS DEPARTMENT

Irrigation
Account

READ—the following papers :—

I

G.O. No. 1142 I., dated 15th November 1906.

II

Inspection notes of J. S. Westerdale, Esq., Officiating Executive Engineer, Madura Division, for the month of September 1915.

THEKKADY—24th September 1915.

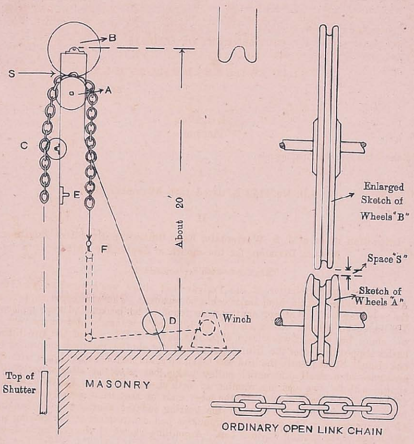
The emergency shutter of the Periyar head sluice was lowered on the 16th August in order that the head sluice could be repaired. The wire ropes supporting the roller cages of the Stoney shutter were found to be broken and were replaced. The emergency shutter was raised on the 18th and fortunately cleared the vent of the sluice but when it was within about 20 feet of F.T.L., one of the two lifting chains slipped back over the lifting pulley and the shutter remained suspended on one chain. Subsequently the load was taken up again on the second chain with the assistance of a small differential pulley tackle, but a second attempt to lift the shutter with its own gearing resulted in both chains slipping. The Sub-Division Officer took the precaution to tie the loose ends of the chain securely to the Tee iron cross bracing E of the frame of the gearing and the shutter was left hanging for my inspection. The cause of the trouble is bad construction of the gearing and the design of the gearing which is bad. An outline sketch of the gearing is shown herewith.

The wheel A is the wheel by which the lift is transmitted to the chain.

The chains are the ordinary open link chain made of 1 inch round iron. The wheel A is cast (as shown in sketch) so that it grips the chain links.

The wheel B is a grooved guide wheel running loose in its bearings its duty being to prevent the chain rising off the wheel A. The wheel C is merely a guide wheel to throw the chain clear of the masonry below. The cause of the trouble is that the space "S" between wheels A and B is too great and is in fact wide enough to allow the chain to slip over the wheel S. I witnessed this slipping and saw the chain slip back over the wheel A and between the two wheels. This is a fault in design and construction as the space S is not adjustable the bearings of A and B being rigidly fixed. It may be asked why has this not happened before. The only explanation I can suggest is this. The gearing has very rarely been used, never more than once or twice a year when the shutter was lowered for the painting of the head sluice proper, and the new sharp edges of the wheels A have probably been sufficient to grip the chain. If the gear had been used more frequently however, and the wear had been more rapid the same fault would have occurred before now. Apart from this bad adjustment, the design is bad for the following reasons :—

The gear is worked from a pair of bevel wheels and shaft at D which drive the wheels A (the whole of the arrangement sketched is in duplicate as there are two chains) by means of a small shaft running up the frame approximately on



the line joining the centres "A D" and through gear wheels at the top of frame not shown in the sketch. The point is that it is the wheel "A" which transmits the lift to the chain and the chain on the shutter side is in tension and on the opposite side it is hanging loose. In other words the shutter hangs only on the grip of the chain round the wheel A on an arc of less than 180° as the shutter weighs about 12 tons it will be seen how great is the tendency for the chain to rise off the wheel A. Had the ends of the chain not been tied to the cross Tee there is very little doubt that when both chains slipped together the shutter would have dropped to the bottom. If this had happened no attempt could have been made to raise the shutter until the lake level had been reduced by 18 feet, 132 level with reference to 152 F.T.L. when the lock gates in the cutting could be closed. As the lake can only be lowered to 136 by the regulator at Periyar it would be a very difficult job to get at the fallen shutter until the remaining 4 feet had run off and this would take months if the shutter fell vertically in such a way as to close the head sluice. I consider therefore that the defects are very serious and should receive immediate expert attention. The wheel B can of course be made to fit closer to A by permanently altering the position of the plummer blocks for its shaft, but it would be a great improvement also if some breaking arrangement could be fitted for the chain which at present hangs loose I do not see why the chain could not wind off a large drum into which a powerful brake could be fitted.

I propose to raise the shutter eventually by a winch, pulley block and steel rope tackle. Such an arrangement will be rigged up for each chain and the winches will be worked simultaneously with the lifting gear of the shutter itself. The object of the winch gear is to keep the hanging chain in tension and prevent it rising off the wheel "A", I consider however that it is unsafe to do anything at present as in view of the very serious loss of crops that would result if the shutter did by any chance fall, and I propose to leave it hanging on the chains until the irrigation season is over.

No. 1686-C.E., dated 6th October 1915.

Copy forwarded to the Chief Engineer for Irrigation, Madras, for information. I would suggest that the Superintendent, Public Works Workshops, be asked for his opinion.

2. The present mechanism is evidently quite unsuitable and unsafe.

The Executive Engineer is being asked to have the wire rope tackle fitted up at once in case it is necessary to lower the shutter again this season.

I am also ordering the renewal of the wire ropes on the friction rollers of the head sluice shutters, every two years as this is found to be their life.

C. MILDRED,
Superintending Engineer, VI Circle.

III

Endorsement No. 7711/15 C-1, dated 19th October 1915.

Forwarded to the General Superintendent, Public Works Workshops, for remarks.

(By Order)

F. E. MORGAN,
Asst. Chief Engineer for Irrigation.

To the General Superintendent, Public Works Workshops.

IV

Memorandum No. 7711/15 C-2, dated 19th October 1915.

The Superintending Engineer is requested to report whether a detailed drawing of the gear was furnished with the shutters by Messrs. Ransome and Rapier, and if so, to forward the same for reference and return.

(By Order)

F. E. MORGAN,
Asst. Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle

V

Letter—from W. P. ROBERTS, Esq., A.M.I.M.E., General Superintendent, Public Works Workshops division.
To—the Chief Engineer for Irrigation.
Dated—Madras, the 15th November 1915.
No.—22 E.I.

With reference to your No. 7711/15 C-1., dated 19th October 1915, I have the honour to return herewith the current file in original and to state as follows.

2. The slipping of the lifting chains on the cup wheels marked "A" in the sketch is due to inadequate provision for keeping the links in place in the "cups"

and the tendency to slip may possibly be increased by the latter not being as deep as they should be, so that the efficiency of the grip is dangerously reduced as soon as the points of the projections get worn at all.

3. In the copies of Messrs. Ransome and Rapier's drawings of this shutter which are available in this office the space "S" between the extreme edges of the wheels A and B is given as ½", but the depth of the cups is not shown. They should be at least 1", the same as the diameter of the iron of which the chain is made, and they might be 1⅛" or even 1¼" deep with advantage as in a wheel with so few cups (I believe there are only eight) there is little risk of the chain jamming and the slack part being carried round under the hauling part as occasionally occurs with ships anchor winches where the depth of the cups is much greater and is in fact sometimes exaggerated into a Vee groove with projecting lugs in it.

4. The maker's drawings do not indicate whether the cup wheels are steel castings or of ordinary cast iron. They should be the former. The inspection notes do not state whether the projections between the cups of the existing wheels are damaged or not. This should be ascertained and also full particulars as to the depths of the cups. If the wheels require renewal it is impossible to get steel castings made in India and under present conditions it will probably take a long time to get them out from England.

5. To overcome the difficulties now being experienced, there are two alternatives. One is to replace the existing close link crane chains and cup wheels with plate link chains and sprocket wheels as used for all the large shutters made at the Public Works Workshops for some years past.

The other alternative is to use the existing chains and to improve the gear.

6. In either case it would be most advisable to provide moderate counterweights equal to say about one-third of the load on each chain due to the weight of the shutter. This would always keep the chains tight on their actuating wheels and prevent any tendency to slip or ride over.

7. With plate link chains it would only be possible to lead the chains to the counterweights in the same vertical plane as the centres of the wheels "A" and "C". This practically limits the position of the weights to either directly in front or in rear of the existing structure, the chains being led to the required place around suitable guide pullies.

To have the counterweights in front would add enormously to the already very great overturning moment acting on the superstructure which does not appear to be any too securely anchored down by its 6′ 0″ long holding down bolts in a 6′ 0″ thick wall.

To place the counterweights in rear would mean having to put them in the pit "E" in which the main stoney shutter and its balance weight work. I have no details of the dimensions of this, but so far as I recollect the available space is rather cramped, and the chains would get in the way of the gear "F" which works the Stoney shutter.

8. But if the existing crane chain is used it would be possible to lead it out sideways and to have a weight on each side of the masonry pier as shown in figures 2 and 3 of the attached diagramatic sketch.

For this arrangement there would have to be a steel frame "M" added to the existing structure and the lifting chain after passing round the cup wheel "A" would go round guide pulley "G" and "H" to the counterweights.

9. As however the total travel of the shutter is no less than 49′ 9¾″ the counterweights if directly attached to the chains as at "J" (in figure 3,) would rest on the sloping rock at "L" before the shutter could get above M.F.L. It would be inadvisable to keep the shutter continuously under water for the whole period that the lake is at high level as the endless chain of mild steel live rollers would be very liable to rust up on their pins, which I believe are also of steel and not of brass, so far as I can recollect and can ascertain from the available drawings.

10. The counterweights should therefore be attached to the chains by means of a pulley as at "K" (in figure 2). These pulleys would reduce the travel of the weights to half that of the shutter, but the weights would have to be heavier than if they are directly on the chains. The weight of the shutter is about 12 tons I believe. If the counterweights are four tons each they would maintain a tension of 2 tons on the slack end of each lifting chain which should be ample to ensure safe working.

11. The check rollers "B" should be removed and refixed in the position "D" in figure 1. They are at present placed about the centre of the arc of contact of the chains on the cup wheel "A" whereas they ought to act at the point where the slack chain leaves the cup wheel. That is, the centres of the shafts "A" and "B" ought to be on the same horizontal plane.

12. It is possible that the alteration suggested in paragraph 11 above would alone be sufficient to ensure satisfactory working if the cup wheels are in good condition but I consider it would be safer to provide the counterweights as well as I believe that the shaft on which the wheels "B" work is comparatively small in diameter and liable to spring or bend if the chain tends to slip out of the cups in the wheels at "A". It is not practicable to fit a much larger diameter shaft to the existing wheels at "B" as the teeth of the main spur wheel on the shaft "A" (not shown on the sketch) already almost touch the shaft "B".

This could be got over by making new wheels for "B" of a larger diameter or else by tying together the shafts "A" and "B" by two bearings connected to each other by tension bolts.

VI

Endorsement No. 7711/15 C-3, dated 22nd/23rd November 1915.

Copy forwarded to the Superintending Engineer, VI Circle, for information. He is requested to give his opinion regarding the suggestions of the General Superintendent and furnish him with the further information asked for.

2. The report called for in this Office Memorandum No. 7711/15 C/2, dated 19th October 1915, is awaited.

(By Order)

F. E. MORGAN,
Asst. Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.

VII

Letter—from M.R.Ry. Rao Bahadur L. D. VENKATARAMA AYYAR Avargal, B.A., B.C.E., Superintending Engineer, VI Circle.

To—the Chief Engineer for Irrigation.

Dated—Trichinopoly, the 29th November 1915.

No.—1911 C.E./644.

With reference to your memorandum No. 7711/15-C-2, dated 19th October 1915, I have the honour to forward herewith the detailed drawing of the lifting gear furnished by Messrs. Ransome and Rapier.

VIII

Letter—from M.R.Ry. Rao Bahadur L. D. VENKATARAMA AYYAR Avargal, B.A., B.C.E., Superintending Engineer, VI Circle.

To—the Chief Engineer for Irrigation.

Dated—Trichinopoly, the 26th January 1916.

No.—171-C.E.

Referring to your memorandum No. 7711/15-C-3, dated 23rd November 1915, and in continuation of this office No. 109 C.E., dated 17th January 1916 (reply to

reminder) I have the honour to submit herewith a copy of the report, dated 15th January 1916, from Mr. Westerdale, Executive Engineer, Madura division. I have not yet inspected the Periyār head-sluice and I am not therefore in a position to give my opinion. A copy of the Executive Engineer's report has been sent to the General Superintendent, Public Works Workshops division.

2. The report called for in your memorandum No. 7711/15-C-2, dated 19th October 1915, was submitted with this office No. 1911 C.E., dated 29th November 1915.

ENCLOSURE

Letter—from J. S. WESTERDALE, Esq., Executive Engineer, Madura division.

To—the Superintending Engineer, VI Circle.

Dated—Camp Uttamapalaiyam, the 15th January 1916.

In reply to your No. 10940/641, dated 16th December 1915, I have the honour to report as follows with reference to letter No. 22 E.I., dated 15th November 1915, from the General Superintendent, Public Works Workshops, to the Chief Engineer for Irrigation.

2. *The space "S" between the extreme edges of the guide and cup wheels is $\frac{9}{16}$ of an inch.* Even $\frac{1}{2}$ inch is too great for this space and there is no reason why it should not be reduced to as near "Nil" as can safely be permitted, $\frac{3}{16}$ inch to $\frac{1}{4}$ inch would be ample.

3. *The depth of the cups is under one inch.* Measurements at various points ranging between $\frac{15}{16}$ inch and $\frac{7}{8}$ inch. It will be seen therefore that the cups are much too shallow.

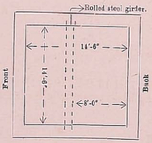
The depth of central groove of cup wheels is $2\frac{7}{32}$ inches to $2\frac{1}{4}$ inches.

4. *The cup wheels are, I believe, made in cast iron* as the broken edges disclose a granular formation and the surface can be filed with a fairly blunt file.

The projections between the cups are worn at the corners. In only one or two cases small bits have chopped off, the wear in most cases appearing as though the metal had been crushed or squeezed off as the chain slipped over the wheel.

If the cups were a little deeper I should not consider the damage to be serious enough to necessitate new wheels at present. As it is, however, I consider the combined faults make new wheels necessary.

5. *Counterweights* may be tried before new wheels are ordered. There is no objection to the counterweights being in rear of existing structure. There is plenty of room in rear of all the existing Stoney shutter gear, the available area being 8′ 0″ × 14′ 6″ as per sketch. All the space back of the rolled steel girder is available both above the platform and inside the well.



Plan of sluice well.
Dimensions only accurate to within one or two inches as the well was covered with wooden planks with small trap door in it.

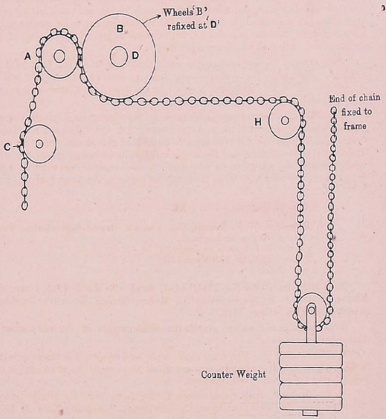
The proposal to refix the check wheels B at position "D" may be acted upon with advantage. I would suggest, however, that these wheels may be replaced by broader ones (if necessary) and also made to guide the chain into a horizontal line before passing over the guide wheel "H" of the counterweight arrangement.

The existing shaft of the pair of wheels "B" is of 3 inches diameter and the unsupported length between bearings is 4′ $1\frac{3}{4}$″.

The clearance between the shaft of wheels "B" and the outer edges of teeth of spur wheel is *one inch* so the shaft could be increased to 4 inches and still leave a clearance of $\frac{1}{2}$ inch.

I do not consider that the alteration of the position of the wheels " B " would alone ensure satisfactory working with the existing cup wheels and agree with Mr. Roberts that counterweights would be safer in any case.

As the counterweights can be hung over the pit in rear of the Stoney shutter plate link chains could be used. I believe there is always a risk, however, of such chains becoming rusted up solid and in this case when the shutter is not ordinarily lowered more than once a year the risk would be much greater.



IX

Memorandum No. 7711/15-C.-4, dated 9th March 1916.

In his letter No. 171 C.E., dated 26th January 1916, the Superintending Engineer, VI Circle, states that a copy of the report, dated 15th January 1916, by the Executive Engineer, Madura division, regarding the emergency shutters, Periyār head-sluice, made with reference to Public Works Workshops letter No. 22 E.I., dated 15th November 1915, has been forwarded to the General Superintendent.

The General Superintendent is requested to report what further suggestions he has to make in the matter with reference to the Executive Engineer's report (a copy of which has been sent to this office).

(By Order)

F. E. MORGAN,
Asst. Chief Engineer for Irrigation.

To the General Superintendent, Public Works Workshops.

X

Inspection notes on the Periyar water works by M.R.Ry. Rao Bahadur L. D. Venkatarama Ayyar Avargal, B.A., B.C.E., Superintending Engineer, VI Circle, dated the 26th February 1916.

Periyar lake, dam and head works—Periyar dam.—The dam is in good order. There is very slight leakage noticed in rear of the dam, and this is practically nothing compared with the capacity of the lake.

The surplus escape or regulator.—The surplus escape on the right of the reservoir dam consists of a regulator with 10 vents each 36 feet wide and 16 feet high fitted with counterweighted lift shutters. The shutters require to be painted and as the water in the lake has gone down to within about a foot of the bottom of the shutters, the painting may be taken up at once.

Head sluice at Thekkady.—The emergency shutter is not raised fully as it has stuck up. Fortunately the shutter is not down as otherwise the supply will be intercepted. After the head-sluice is closed for the season, the shutter will have to be examined.

The measuring weir.—It was mentioned by the Executive Engineer that the maximum reading in front of the weir was formerly 2·6, but it does not rise higher than 2·50. This may be due to changes in the bed of the stream above the weir. The details of the calculations of discharges will have to be looked into to see what velocity of approach was taken for calculating the discharge over the weir and if any gaugings of the stream were taken previously for preparing discharge tables.

XI

Letter—from W. P. ROBERTS, Esq., A.M.I.M.E., General Superintendent, Public Works Workshops.
To—the Chief Engineer for Irrigation.
Dated—Madras, the 29th March 1916.
No.—42 E.I.

With reference to your No. 7711/15-C-4, dated 9th March 1916, I have the honour to state as follows regarding the Madura division Executive Engineer's report, dated 15th January 1916.

2. It would be advisable to provide the counterweight in the rear position as this is practicable.

3. The existing close link crane chain can be used as plate link chains certainly are liable to rust up if constantly submerged, as they would be at one end or the other during the period of full lake level.

4. I consider it would be advisable, if possible, to have the counter weight directly attached to the chains without the intervention of a pulley block to halve the motion. If the sluice pit in rear is of the same section right down to the tunnel, this could be managed by making the framed structure for carrying the last pulley high enough to give the required travel without the weight going below the top level of the tunnel. It would be advisable to provide guides for the balance weight to keep it from swinging about if acted on by any surging of the water in the Stoney sluice pit.

5. The existing wheels "B" are too weak for position "D" new ones would have to be made of a suitable strength and of such a diameter that their shaft does not foul the teeth of the main 4′ $7\frac{11}{16}$″ diameter spur wheel on the cup wheel shaft.

6. The report does not say how much the edges of the cups of the existing wheels are chipped. If they are in a really very bad state they should be removed during the present closure and sent to the Public Works Workshops for new ones to be made in advance of any other works which it may be decided to do to the gear. I believe the tunnel is closed now and the emergency shutter could therefore be supported on packings while the wheels are removed. The new wheels can be made with $\frac{1}{8}$″ deeper cups by lining up one of the existing ones for use as a pattern. Before removing the chains and wheels their fit should be most carefully examined

to see whether the pitch of the chains agrees exactly with the pitch of the cups in the wheels. If the chains have worn at all at the points of contact of one link on the next, the actual pitch will have lengthened and it will be necessary to increase the pitch diameter of the wheels to suit.

7. In order to enable me to prepare a detail drawing of the proposed alterations, I request that the following particulars may be sent to me :—

(*a*) An accurate and fully dimensioned drawing of the whole of the masonry of the sluice tower from sill level to the top, and from the front to the back of the tower, giving full details of the pit and any obstructions in it. This drawing should be to at least a scale of 1/4 = 1 foot and give the plan view longitudinal section and a cross section at the Stoney sluice pit.

(*b*) A detailed dimensioned sketch of the size of the links of the chain.

(*c*) A detailed dimensioned sketch of the top 3′ 6″ of the channel frames carrying the cup wheel bearings and wheel "B", showing the section of channel used, and a section of the frame just above and just below the bearings of the cup wheel shaft, as the details are not quite clear from the blue prints in this office.

(*d*) It should be stated what length of chain is left hanging loose in the rear of the cup wheels when the shutter is fully lowered at present. These chains will probably have to be lengthened.

8. Copies of this letter are being sent to the Superintending Engineer, VI Circle, and the Executive Engineer, Madura division, for information. Without the particulars asked for in paragraph 7 above I am unable to do anything further in the matter.

XII

Memorandum No. 7711/15 C.-5, dated 11/14th April 1916.

With reference to the correspondence ending with his letter No. 171 C.E., dated 26th January 1916, regarding the emergency shutter, Periyar head sluice, the Superintending Engineer, VI Circle, is requested to furnish without delay direct to the General Superintendent, Public Works Workshops, the information asked for by him in his letter No. 42 E.I., dated 29th March 1916, to the undersigned, copy of which was also sent to the Superintending Engineer for information.

2. The cup wheel referred to in paragraph 7 of General Superintendent's letter should also be sent to Public Works Workshops. It would also be advisable to send him a whole length of chain as well.

W. M. ELLIS, Col., R.E.,
Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.
Copy to the General Superintendent, Public Works Workshops.

XIII

Memorandum No. 7711/15 C.-6, dated 20th June 1916.

Telegram from the General Superintendent, Public Works Workshops, No. 24 E.I., dated 23rd June 1916.

Telegram to the General Superintendent, Public Works Workshops and the Superintending Engineer, VI Circle, dated 23rd June 1916, No. 43 O.

XIV

Letter—from W. P. ROBERTS, Esq., A.M.I.M.E., General Superintendent, Public Works Workshops.
To—the Chief Engineer for Irrigation.
Dated—Madras, the 4th July 1916.
No.—30 E.I.

With reference to your No. 7711/15 C.-5, dated 11th/14th April 1916, I have the honour to enclose herewith blue print S.P. No. 344 showing my proposals for providing a guide frame and balance weights for the tail end of the lifting chains of the Periyar emergency shutter.

2. The design provides for a set of cast-iron balance weights totalling $7\frac{1}{2}$ tons against the 12 tons which the shutter itself weighs.

3. These weights will slide in a steel guide frame structure of sufficient height to give the full extent of travel required for the shutter, i.e., 49′ 6″ without the weight coming below the top of the tunnel.

This structure would consist of four mild steel angles well braced together, and strutted at the top from the existing head frame structure so that the side strain caused by leading the chains to the balance weights would be entirely self-contained and cause no overturning moment on the existing structure, but will instead increase its stability by the amount of the down pull on rear side of the cup wheels.

4. The central eye bolt carrying the weights will be attached to the ends of the two chains by a yokepiece so as to equalise the load and tension on each chain and to allow for the difference in the total length of the same number of links in the two chains, which so far as I recollect amounted to about 4″ in 50′. The shutter itself is already attached to the other end of the chains by a similar yokepiece and link for the same reasons.

5. The approximate cost of the proposed new balance weights, their new guide frame structure, complete with pulleys, shafts, bearings and additional chain required for the arrangement shown, and also two new cast-iron cup wheels for the main lifting shaft would be Rs. 3,400 at the Public Works Workshops, Madras. The cost of railway freight to Kodaikānal road station and conveyance thence by road to Thekkady would be say about Rs. 500 as the total weight is about 13 tons. Erection at site should not cost more than Rs. 300 if the services of the existing local establishment are fully utilized.

The total cost of the improvements would therefore be Rs. 4,200.

6. I am sending copies of this report to Superintending Engineer, VI Circle, and to the Executive Engineer, Madura division, for information, and I request the favour of orders as to whether the proposals are approved and the work is to be carried out or whether any modifications are desired.

XV

Memorandum No. 7711/15-C.-7, dated 10th July 1916.

In continuation of this office memorandum No. 7711/15 C.-5, dated 14th April 1916, regarding the emergency shutter of the Periyar head sluice, the Superintending Engineer, VI Circle, is requested to offer his remarks on Mr. Robert's proposal detailed in his letter No. 30 E.I., dated 4th July 1916, a copy of which has been sent direct to him. The report should be submitted so as to reach this office by the end of July at the latest.

(By Order)

F. E. MORGAN,
Asst. Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.
Copy to the General Superintendent, Public Works Workshops.

XVI

Letter—from M. O'BRIEN, Esq., Executive Engineer, Madura division.
To—the Superintending Engineer, VI Circle.
Dated—the 21st July 1916.
No.—949-S.E.

I have the honour to report that I have no remarks to offer on the proposals except that it seems to me hardly necessary to provide as much as 7½ tons of balance weights. I think this weight could be reduced with advantage to say 5 or 6 tons.

No. 2060 *C.E., dated* 31*st July/2nd August* 1916.

Forwarded to the Chief Engineer for Irrigation with reference to his Memorandum No. 7711/15 C.-7, dated 10th July 1916.

2. The undersigned has no further remarks to offer.

A. C. LANGSTON,
Superintending Engineer, VI Circle.

XVII

Note by the Chief Engineer for Irrigation, No. 1067-E., dated 28th August 1916.

In his inspection notes for September 1915 of the Periyar Head Works the Executive Engineer, Madura division, brought to notice that the gearing of the emergency sluice gate was in an unsafe condition and required immediate attention. Proposals were then called for from the General Superintendent, Public Works Workshops, for remedying the defects and the latter officer in consultation with the Superintending Engineer, VI Circle, submits an estimate amounting to Rs. 3,400 for replacing certain worn-out parts of the gearing and for providing counter-weights to facilitate the working of the shutter. The estimate which has been raised to Rs. 4,400 on account of the addition of conveyance and fitting charges is recommended for sanction.

W. M. ELLIS, Col., R.E.,
Chief Engineer for Irrigation.

To the Secretary to Government,
Public Works Department (Irrigation Branch).

Order—No. 370 I., dated 28th August 1916.

The following estimate is sanctioned :—

Imperial.
Irrigation.
49. Capital expenditure not charged to Revenue.
Open Capital Account.
Periyar System.
Madura Division.
I. Works.
1. Head Works.
C. Works.
[Unremunerative work.]

Improvements to the emergency shutter of the Periyar Head Works at Thekkady.

	RS.
Estimate—	
I. Works	4,400
II. Establishment	224
Total ...	4,624

2. The sanction accorded in paragraph 1 above is registered as No. 54 I. of 1916-17 and will expire on 31st March 1918.

(True Extract)

W. M. ELLIS, Col., R.E.,
Secretary to Government, P. W.D.
(Irrigation Branch).

To the Superintending Engineer, VI Circle, with estimate.
,, Accountant-General, Madras.
Copy to the General Superintendent, Public Works Workshops, Madras, with a copy of the estimate.

Forwarded to the

(By Order)

Manager.

PUBLIC WORKS DEPARTMENT
(IRRIGATION BRANCH).

NOTES CONNECTED WITH G.O. No. 370 I., DATED 28TH AUGUST 1916.

[SUBJECT.—*Improvements to the emergency shutter of the Periyar head sluice at Thekkady, Madura division.*]

From the Chief Engineer for Irrigation, Note No. 1067 *E., dated 28th August* 1916.

With the note read above the Chief Engineer for Irrigation forwards for sanction an estimate amounting to Rs. 4,400 for "works" or Rs. 4,624 (estimate charges of $21\frac{1}{2}$ per cent calculated on Rs. 1,000 conveyance charges and Rs. 40 packing and cart hire) inclusive of establishment charges for remedying certain defects in the machinery of the emergency shutter of the Periyar head works at Thekkady and for providing counterweight arrangements for the same to increase its stability. It is reported by the Executive Engineer that the defects in the existing shutter are very serious and require immediate attention. The estimate which has been based on the particulars furnished by the General Superintendent, Public Works Workshops, Madras, may, under the circumstances, be sanctioned.

As it is stated that when the proposals are carried out the stability of the structure will be improved the estimate seems a proper charge to "49. Capital Account" of the Periyer system. A draft order is accordingly submitted for approval and orders to issue.

M.R.A.—22-8-16.
M.S.V.—23-8-16.

F. E. MORGAN—25-8-16.

Issue.

W. M. ELLIS—25-8-16.

[G.O. No. 370 I., dated 28th August 1916.]

28

Sectt. 11-8 (e)—32,005—27-1-16.

No 7711/15 C.—6 of 20-6-16

23 P

Memo

With reference to this office memo No 7711/15 C-5 of 11/14 · 4 · 16. the ~~S.E.~~ G.S. P.W.W. SW. is requested to report if the information required by ~~the~~ him ~~for the S.E. VI has been received &~~ ~~Genl Supt P.W.W. has been furnished~~ and when his report regarding suggestions for further action to be taken in respect of the Periyar Emergency Shutter may be expected.

19-6-1916

19.6.16

Pr. ... 20-6-16

L27g

DESPATCHED
Date 20/6
Enclos. ...

To

~~S.E. VI~~ Gl. Supdt. P.W.W.

... 29/VI/16.

26

29

PUBLIC WORKS DEPT., IRRIGATION
Ootacamund
23 JUN 1916
No. 345/16
GOVERNMENT OF MADRAS

C.

INDIAN TELEGRAPHS.

NOTICE.

This form must accompany any inquiry made respecting this Telegram.

Charges to pay.		Office Stamp.
Rs.	As.	22 JU 16 OOTACAMUND

Handed in at (Office of Origin).	Date.	Hour	Minute	Service Instructions.	Words.
MADRAS WS	22	20 HRS		STATE	33

TO

Recd. here at H. 21 HRS M.

CHIEF SECRETARY GOVERNMENT OF MADRAS 23 JUN 1916

MADRAS IRRIGATION OOTY

YOUR 7711DASH 150F JUNE 11TH DRAWINGS ONLY RECEIVED FROM

8TH CIRCLE TODAY PLEASE WIRE WHETHER PROPOSALS MAY BE

OVER TILL AUGUST PENDING MY RETURN FROM PRIVEKEGE LEAVE

ROBERTS

N. B.—The name of the Sender if telegraphed is written after the text.

Gulab Singh & Sons Calcutta—No. 208 ... 19-14 ... 10,000 Bks.

27

O.F.-46

POST COPY OF TELEGRAM.

No. 2463, dated 23-6-1916.

State or private State.

Express or ordinary Ordinary

From station Madras.

Office of the General Superintendent, Public Works Workshops.

To station Ootacamund.

To officer or person The Chief Engineer for Irrigation, Madras.

Your 7711 dash 15 C. F. June eleventh drawings only received from Sixth Circle today. Please wire -- whether proposals may lie over till August pending my return from privilege leave.

Roberts.

PUBLIC WORKS DEPT., IRRIGATION
Ootacamund.
26 JUN 1916
No.
GOVERNMENT OF MADRAS.

(Signature.) Haughton 23/6/16
for General Superintendent,
(Designation of the officer.)
Public Works Workshops.

To

The Chief Engineer for Irrigation,

Ootacamund.

31

Scott. II-8 (c)-32,000-27-1-16.

quote

26 quote

Issue
pro note
& key file

Telegram
State
ordinary.

To

(Roberts).
superintendent. Pr. Works

T.43-G.

reg 9

regarding emergency shutter Periyar

Key file / your telegram (of) yesterday. If you can deal with (the) matter in August it will suffice

Madras Engineer

23/6/16

DES

Telegram & post copies

DESPATCHED
DATE 23/6
ENCL. ... 6

SE

23/6/16

23/6/16

RS

Please send post copy

Copy with copy of telegram to SE VI for information

29

38

C. 7711/15.

C.f. pp. 1-6 From the Supdt. Engr. VI circle No. 1686. C.E. d. 6.10.15
p. 8. To the General Supdt. P.W. Workshops Madras Endt. No. 7711/15 C.1 d. 9.9.15
p. 9. .. Supdt. Engineer VI circle No. 7711/15-C.2 d. 9.10.15
pp. 10-13 From the General Supdt. P.W. Workshops Madras No. 22. E.d. 15.11.15
p. 14 To the Supdt. Engineer VI circle Endt. No. 7711/15-C.3. d. 23.11.15
p. 15 From the — do — do — No. 1911.CE/644. d. 29.11.15
Quote — p. 16 { Reminder to — do — do — No. 7711/15. d. 22.12.1915
Reply to reminder from — do — No. 75/C.E. d. 10.1.1916 }
Quote — p. 17 { Reminder to — do — do — No. 7711/15. d. 10.1.1916
Reply to reminder — do — do — No. 109/C.E. d. 17.1.1916 }
pp. 18-22 From the Supdt. Engineer VI circle No. 171. C.E. d. 26.1.1916
p. 23 To the — do — do — No. 7711/15-C.4. d. 9.3.16
p. 24 From the S.E. VI circle, Inspection notes d. 26.2.1916 on the Periyar works
pp. 25-26 From the Genl. Supdt. P.W. Workshops, Madras No. 42. E.D. d. 29.3.16
p. 27 To the Supdt. Engr. VI circle memo No. 7711/15-C.5. d. 14.4.16
p. 28 To the — do — do — memo No. 7711/15-C.6. d. 20.6.16
Quote — { pp. 29-30 From the Genl. Supdt. P.W. Workshops Madras Telegram No. 24. E.D. d. 23.6.16
p. 31 To the — do — do — & the S.E. VI circle, Telegram d. 25.6.16 }
pp. 32-34 From the — do — do — No. 30. E.D. d. 4 July 1916
p. 36 To the — do — do — & the S.E. VI circle No. 7711/15-C.7 d. 10.7.16
p. 37 From the Supdt. Engineer VI circle No. 2060. C.E. d. 2.8.1916

32P

Note by the Chief Engineer
for Irrigation. No. 1067. E d. 28/8/1916

In his inspection notes for September 1915 of the Periyar Head Works, the Executive Engineer, Madura Division, brought to notice that the gearing ~~mechanism~~ of the emergency sluice gate was in an unsafe condition and required immediate attention. Proposals were then called for from the General Supdt. P.W. Shops for remedying the defects ~~in the mechanism~~ and the latter officer in consultation with the Superintending Engineer VI Circle submits an estimate amounting to Rs. 3400/- for replacing certain worn out parts of the gearing and for providing counter weights to facilitate the working of the shutter. The Estimate which has been raised to Rupees 4400/- on account of the addition

Paga 2 to 6 (margin)

Genl. Supdt. P.W.W. letter No. 30 E.D. 4.7.16 cf. p. 32

C.f. p. 35 flagged

of

35

338 39

of conveyance and fitting charges is recommended for sanction.

18/8/16.

25/8/16

25/8/16

18/8/1916

To,

The Secretary to the Government

(P.W.D. Irrigation)

Sect. I—10 (a) Emergency Shutter of the Periyar Head-Sluice at Thekkady: Periyar System Public works DEPARTMENT. (Irrigation Branch)

Sanctioning an estimate amounting to Rs 4624/- for improvements to the ——: Madura Division

{Sluices Regulators Estimates

B 368 P

READ AGAIN G.O. No. 1142-I. [illegible], dated 15th November 1906 19

" " " " , " 19 1/10

READ ALSO:—

C+Kp 1–39 C. No. 7711/15-13 From the Ch. Engineer for Irrigation Madras (Private) note, No. 1067 E, dated 28th August 1916.

" " , " " , " , " 19 .

" " , " " , " , " 19 .

34 P

ORDER. No. 370 I, dated 28th August 1916.

Press

The following estimate is sanctioned:—

Imperial

Irrigation

49. Capital Expenditure not charged to Rev.

Open Capital Account

Periyar System

Madura Division

I works

1 Head-works

C works

[remunerative work]

Improvements to the Emergency Shutter of the Periyar Head-works at Thekkady.

Estimate	I works ..	Rs 4400
	II Establishment .	224
	Total Rs	4624

21½% on Conveyance charges (Rs 1000) & Packer & Cart hire (Rs 40) = Rs 1040/-

37

Scott, 11-8 (c)—32,005—27-1-16.

35P

2. The sanction accorded in para 1 above is registered as No. 54 of 16-17 and will expire on 31st March 1918

For approval

23/8/16.

27/8/16

25/8/16

DESPATCHED
Date 30/8
Bearer Sent to se copy ...

To

The S.E. VI Circle [with est ...] M.S.

.. Acctt. General, Madras.

Copy to the General Supdt. P.W. Workshops Madras M.S.
with a copy of the Estimate

[Not for E.T.]

22-8-16

Signed & despatched on 17-11-16

17-11-16.

T.S. ...
R ...
... 29/8

38

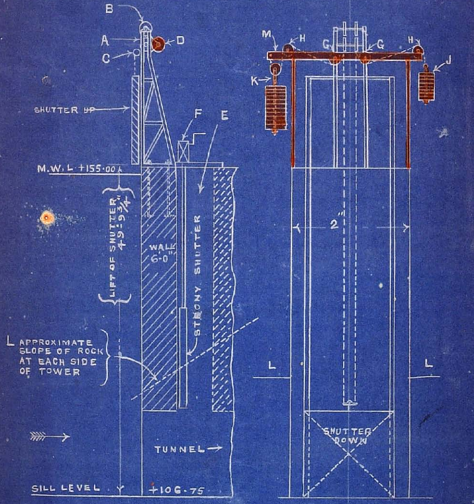


Fig 1 Fig 2 Fig 3

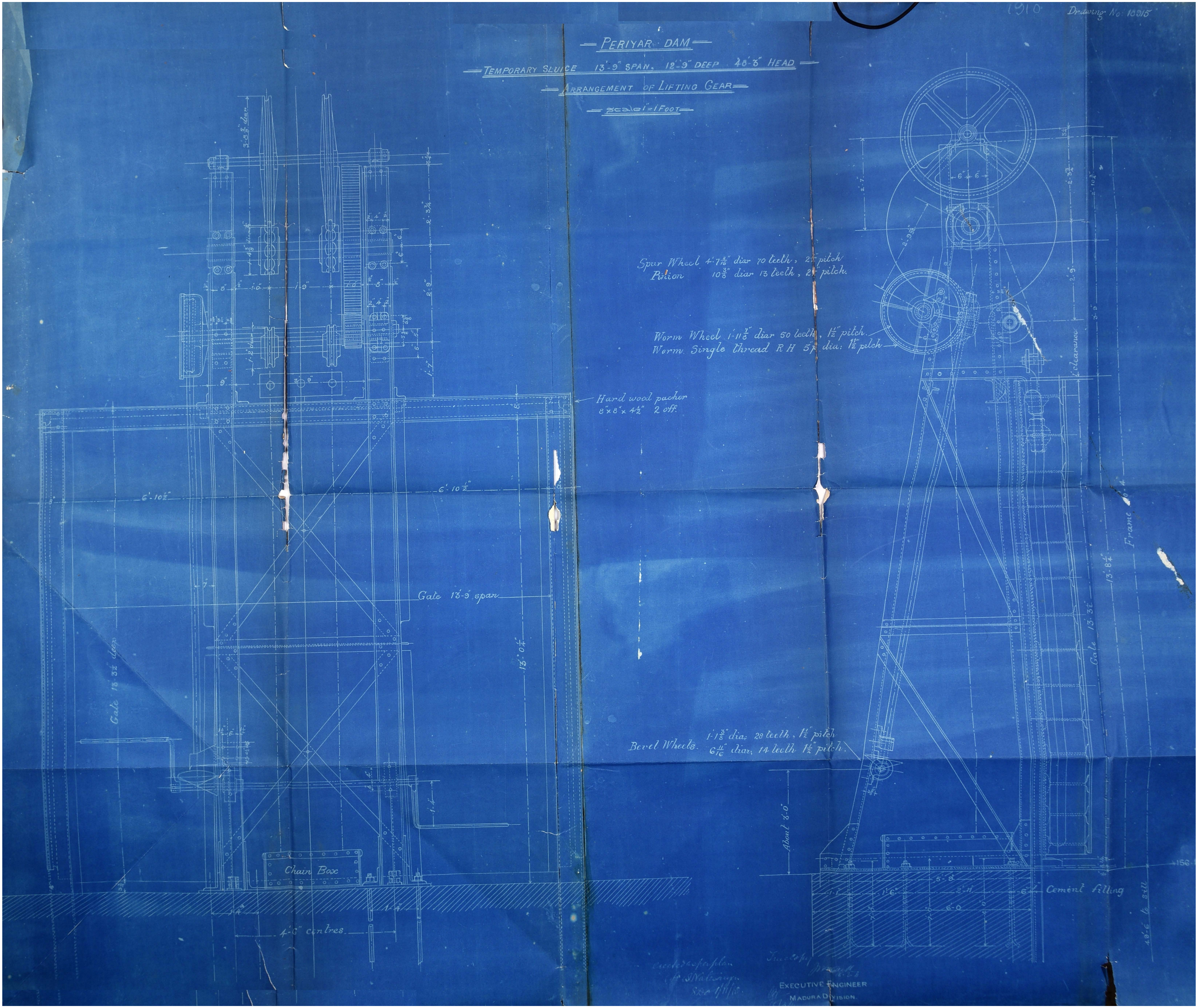
DIAGRAMATIC SKETCH OF SUGGESTED ALTERATIONS TO EMERGENCY SHUTTER. PERIYAR H.P. SLUICE

W. Roberts
15-11-15

GENERAL SUPERINTENDENT
PUBLIC WORKS WORKSHOPS MADRAS

S.P. No 283

Accom[illegible]
No. 8937 17-11-75


1910
Drawing No: 10015
PERIYAR DAM
TEMPORARY SLUICE 13'-9" SPAN, 12'-9" DEEP 48'-8" HEAD
ARRANGEMENT OF LIFTING GEAR
scale 1"=1 Foot
Spur Wheel 4'-7 7/16" diar 70 teeth, 2½" pitch
Pinion 10 3/8" diar 13 teeth, 2½" pitch.
Worm Wheel 1'-11 7/8" diar 50 teeth, 1½" pitch.
Worm Single thread R H 5" dia: 1½" pitch
Hard wood packer 8"×8"×4½" 2 off.
Gate 13'-9" span
Gate 13'-3½" deep
Chain Box
4'-6" centres
Bevel Wheels. 1'-1 3/8" dia: 28 teeth, 1½" pitch
6 11/16" dia: 14 teeth 1½" pitch.
About 8'-0"
Cement filling
Gate 13'-3½"
Frame
EXECUTIVE ENGINEER
MADURA DIVISION.